12/15/82 R5650-2A

JEI REPORT

JAPAN ECONOMIC INSTITUTE

No. 47A December 10, 1982

THE STRUCTURE OF JAPANESE EDUCATION

SUMMARY

In Japan, the government and the private sector share a view that the country's future will be shaped by its competitiveness in high-technology fields. They recognize that the bottom of this pyramid is the quality of education. Since modernization began one hundred and thirty years ago, education has been a top government priority. With the advantage of a historically high educational standard, Japan today enjoys almost 100 percent literacy and its students consistently score top marks on international tests in mathematics and science.

This paper will examine the scope of the educational system, the government and the private sector's involvement in shaping policy and the business community's view of the development of human resources.

Postwar Education in Japan

Under the direction of the American Occupation, educational policy in the immediate postwar period aimed at eliminating the militarism and ultranationalism that were associated with the military's expansionist policies. The system today is quite similar to the United States, with nine years of compulsory education, three-year high schools and two- and four-year colleges. It is, however, a highly centralized system. The national government has always played a dominant role in shaping educational policy, which has the advantage of elevating the level of education through curriculum guidelines. This policy has also been criticized because it does not allow individual schools to be flexible. Recently, however, the government and educators have made greater efforts to adjust educational policy to changing needs of students and conform it to parental preferences.

Japan provides all children with nine years of free and compulsory education. There are three types of schools — national, public (prefectural and municipal) and private. After grammar school, students have a choice of senior high schools aiming at college admission or vocational schools in agriculture, business, commercial fishing and home economics. Still other schools offer training in commercial shipping, telecommunications, physical education and the fine arts. There are also night schools for working students and correspondence courses, both of which offer high-school degrees.

Higher education is provided by national, public and private universities, teachers colleges, nursing schools, and four- and five-year professional schools. The curricula include the humanities, social sciences, natural sciences, engineering, agriculture, education and medicine (including public health). Major universities offer M.A. and Ph.D. degrees for most disciplines.

After the war, the government's goal was to provide an education for all Japanese children. As Table 1 shows, this was rapidly achieved.[1] The number of children in school reflects fluctuations in demography. As a result of the postwar baby boom, 12 million attended grammar schools in 1955 and more than 13 million in 1958, compared with 11 million in 1953. A slowdown in population growth caused the numbers to drop in the 1970s, but since 1978, there has been another increase.

Kindergarten is optional, but 80 percent of four-year-olds and 90 percent of five-year-olds are enrolled. These are largely private (73 percent), with only 26 percent run by municipalities and less than 1 percent operated by the central government. High attendance in non-compulsory kindergartens is explained by the belief that the preparation is essential for grammar school and the programs include considerable training in reading and arithmetic.

In 1950, 42 percent of students went on to senior high school. By 1980, that number was 94 percent, of which a slightly higher number were girls (95 percent of junior high graduates) than boys (93 percent). By comparison, more than 90 percent have been continuing on to senior high schools in the United States since 1960. In France, by comparison, 70 percent of all students went to high school in 1970, while in England, only 20 percent did so in 1974. According to the latest statistics available (1980), 4.6 million Japanese students attended high school. Of these, almost 150,000 attended evening courses and worked during the day.

Cost of Education — Public school expenses for parents are minimal — lunches, school outings, and some curriculum-related items. In 1979, parents paid ¥43,000 ($175 at current exchange rates) a year per child in elementary school, ¥75,000 ($305) in junior high school and ¥153,000 ($622) in senior high school. In 1966, the parents' share of costs was more than 13 percent in grammar schools, but by 1974 it declined to less than 10 percent, and by similar margins in upper schools.

The cost of education to the nation in 1978 came to ¥14 trillion ($57 billion), of which the government provided 80 percent.[3] This is a dramatic increase from 1950 when the amount was only ¥174 billion ($707 million) and it has far outpaced inflation. Since 1950, the ratio of educational expenditures to GNP has been steadily increasing, from the 5-to-6-percent level in the 1950s to 8.4 percent in 1978, a ratio that is within the same range as the United States. Government expenditures for education have been between 10 and 13 percent of the total central government budget since 1955; municipal government education expenses have ranged from 25 to 28 percent during the same period. In the first nine years of school, an international comparison of education expenses shows that Japan spent 43 percent on teachers' salaries in 1978, compared with 56 percent in the United States, 61 percent in West Germany, 67 percent in England and 83 percent in France.

Financial assistance to families who are unable to meet expenses is available to cover the cost of school lunches and excursions. There are scholarships provided by national and municipal governments for handicapped children who attend special schools for the blind and the deaf. Scholarships based on need are also awarded to high school and college students by government and private foundations. The nationally run Nihon Ikuei-kai, for example, awarded ¥92.5 billion ($376 million) to 380,000 students in 1980.

Curriculum — The Ministry of Education in 1947 developed academic guidelines for graduation, and has since amended them four times to adjust to changing social expectations.[4] At present, grammar school students are taught Japanese language and

The JEI REPORT (ISSN 0744-6489) is published weekly for $40 per year by the Japan Economic Institute of America, 1000 Connecticut Avenue, N.W., Washington, D.C. 20036. Second class postage paid at Washington, D.C. POSTMASTERS: Send address changes to JEI, 1000 Connecticut Avenue, N.W., Washington, D.C. 20036.

literature, social studies, mathematics, science, music and art, home economics and physical education. In junior high schools, students are required to take Japanese language and literature, social studies (including history, philosophy and civics), mathematics-science (including physics, chemistry, biology and geology), music, art and physical education. Foreign languages, home economics and other subjects are optional, but English is virtually compulsory.

In senior high schools, the curriculum is more flexible after the first year in which students take Japanese language and literature, classics, civics, science and mathematics. One optional course per year is chosen from a group including music, art, calligraphy or physical education.

There is a heavy emphasis on mathematics for students preparing to take college entrance examinations because the Japan University Association, which sets standards, requires a high degree of mathematical competence. In the second year, the mathematics curriculum includes probability and statistics, vector analysis, differential and integral calculus, number theory and computer science. Students can also take optional courses in algebra, geometry, pre-calculus, calculus and statistics. Course selection depends on the individuals' goals and desire for technical training, but the mathematics requirement applies to all public high school students.

Candidates for admission to national and public colleges are required to take an examination covering seven subjects — Japanese language, social sciences (two), mathematics, science (two) and foreign language (English, German or French). This means that all national/public Japanese college students have passed examinations that include the required mathematics training and at least one advanced math course regardless of their college majors. Top level private universities also require vigorous math examinations, depending on the student's desired major.

College Education

In 1980, about 38 percent of all high school graduates entered college, close to the level in the United States. The number of Japanese college students shot upward in the latter half of the 1960s, while the number in other advanced countries increased only gradually. In 1978, college attendance in Japan reached an all-time high of 2.26 million -- ten times higher than in 1950.[5] In 1980, 1.84 million attended four-year universities (including 50,000 in graduate schools), 370,000 were in junior colleges and college-level professional schools enrolled 20,000. Of these, 22 percent were in public institutions and the rest in private schools (mostly junior colleges). Although nearly all public universities are co-educational, only 22 percent of the students in four-year programs were women, but they comprise 90 percent of all junior college enrollment.

The Japanese university system requires students to choose a major before taking entrance examinations. In 1980, among four-year college entrants, 40 percent chose either economics and commerce, law or political science. The next largest group was engineering, about 20 percent, which includes computer science, architecture, applied chemistry and physics. The small 3-percent figure for science majors refers to students in theoretical sciences leading to teaching and academic careers. About 14 percent majored in humanities, including literature, sociology, history and philosophy. The concentration in humanities and social sciences has not changed since 1960, but the number of those majoring in engineering has increased sharply. About half of all engineering majors proceed to graduate school; only 10 percent of students from all other disciplines choose this route. Engineering students with graduate degrees are eagerly sought-after and enjoy abundant job opportunities.

Education Outside of Schooling

Because of the intense pressure to pass the college entrance examinations, many students pay for tutoring after school and for preparatory schools if they were not initially accepted at the college of their choice. It is not uncommon to find that half of all college freshmen have had at least one year of post-high school study. These privately run juku (cram schools) are booming. There are a wide variety of such schools, ranging from extensive institutions covering all required subjects to neighborhood classes with only one or two subjects. Since math is one of the most difficult subjects, the demand for good teaching in this area is strong. One organization specializing in this field last year enrolled one million students at 20,000 classes nationwide. This school emphasizes a system of encouraging children to like mathematics, and has attracted a great deal of attention from educators.

Another popular school, although not directly connected with college admission, offers abacus lessons. After the introduction of calculators, there has been an increase in interest in the abacus because of the conviction that depending on machines is not good training for children. The Japan Chamber of Commerce gives certificates for abacus users and the examination is taken into account by many corporations in recruiting clerical staff. Last year, 1.4 million elementary, junior-high and senior-high school students took the exam. There is also a popular national contest among the youth that tests the accuracy and speed of mental arithmetic, including adding, subtracting, dividing and multiplying beyond six figures in just seconds.

Education as an Investment in Human Resources

The belief in the value of education since the Meiji period was based on a premise that a good educational system would impact on the nation's level of economic and military power and provide the foundation to make Japan part of the world community. Was this goal accepted by the public? A strong incentive for its acceptance before World War II was the direct link between education and social mobility. The radical social reform carried out by the Meiji government abolished the rigid class system. It created a European-style school system headed by seven Imperial Universities whose graduates were seen as an elite. Academic competence, not family origins, occupation or income, was the only key with which to enter this class, however. There were opportunities for bright children of poor families to take this path through scholarships provided by local community leaders, which they considered a good investment in human resources, beneficial to the community, and lending a certain prestige to the donor. This elite image of education was a strong incentive to induce the public to embrace learning.

After World War II, the emphasis shifted to compulsory nationwide education. Because of the quantitative progress in numbers of students, college degrees themselves do not automatically guarantee higher income and social status. Instead, the reputation of individual universities largely determines job prospects -- hence the fierce competition to get into prestigious schools. However, recent trends indicate that blind acceptance of job applicants on the basis of their degrees has been disappearing, although large companies still tend to recruit from a limited number of schools.

With a wide range of choices in higher education and the unpredictability of social and economic changes, it is difficult to determine the link between the motivation for higher education and its economic results. A detailed study on education and social mobility points out the various elements included in the consideration of incentives.[6] Access to higher education is determined by individual students' academic records, the family's financial ability and the students' idea of career development. There are also

factors beyond one's control, such as the condition of the economy, recruitment policy, changing industrial structure and shifting demand in expertise.

It is safe to conclude that both the government and the private sector, in their drive to extend and improve the educational system, have moved in the right direction in terms of achieving economic and industrial progress. Almost all junior high school students proceed to senior high schools, and regardless of whether or not these students proceed to college, the nation's general level of understanding of basic scientific knowledge is widespread. The egalitarian educational system is consistently at a high level, as indicated in international comparisons of mathematical ability, and provides a promising fertilizer for technology-oriented industries.

Recent Recruiting Trend

Observers of the labor market point out that in the 1980s college graduates with engineering majors will have little difficulty finding jobs, both with the top manufacturing firms and in other industries which traditionally have not been interested in this background. In the high economic growth period, engineering majors enjoyed a booming labor market, but much slower economic growth after 1973 discouraged aggressive recruitment until in the 1980s, when demand bounced back. Analysts attribute this trend to the realization that the 1980s and 1990s will be a period of diverse and innovative technology which will require heavy expenditures on basic research. The service industry also sees the potential in engineering majors who will contribute to the computerization of operations, the creation of markets through automation and to communication networks.

Interviews to recruit college graduates start in October. Graduation is the following March. However, a number of personnel offices have established information networks to identify promising students, and particularly in the engineering departments where professors closely counsel students on their professional careers. In addition to interviews, school recommendations and examinations are equally important for engineers.

This fall, Nippon Electric Co. (NEC) said it would hire more than 600 engineers next year. Hitachi Ltd. plans to hire about 700, Toshiba Corp. 700 and Sony Corp. more than 500. In a reflection of the rapid progress in electronics and computers, students with these skills have been actively sought. A 1980 survey revealed that the largest consumer appliance and computer makers mostly hired electronic engineers, even though mechanical engineering continues to be popular.[7] Major auto makers have also stepped up their hiring of engineers. Toyota Motor Co., Ltd. hired more than 200 engineering graduates and Nissan Motor Co., Ltd. 300. Half of those recruited by the top manufacturing companies held masters' degrees, unlike most humanities and social science majors who are hired with bachelor degrees and trained by the companies which hire them.

Even though these engineering graduates are recruited as future executives and senior specialists, they are assigned to work in the factories for the first two to three years for training in factory management, inventory and financial flow, quality control and technological innovation. This is repeated at the middle management level to refresh their expertise. With lifetime employment, they are shifted back and forth between headquarters and branch offices, between domestic and overseas assignments and between the parent and subsidiary companies.

The engineers' image of the most desirable companies has not changed much in recent years, and include Hitachi Ltd., Fujitsu, Ltd., NEC, Toshiba, Mitsubishi Heavy Industries, Matsushita Electric Corp., Toyota Motor Co., Ltd., Nippon Steel, Sony Corp.,

Japanese National Railways and Nippon Telegraph and Telephone Public Corporation. At the same time, quite a few engineers enter the civil service or take up academic careers.

Since the number of graduates is less than the demand, competition among companies is intense. The largest companies tend to concentrate on selected national and public universities, which places smaller manufacturing companies and new recruiters from the service industry at a disadvantage. With demand for engineers rising, many private universities which traditionally enrolled a smaller number of engineering students have seen a dramatic increase in recruitment of their engineering graduates. Students in non-engineering majors, on the other hand, have faced much bleaker job-prospects for careers in banking, finance, insurance and trading companies.

Business and Academic Views on Technological Progress

The government and the business community unanimously agree that it is critical for Japan to become a technologically oriented nation. Many experts eye the 1990s as the time when Japan's innovative technological progress will emerge. They are confident that the country has passed through the era of absorbing and applying research done in America and Europe. This view is supported by a statistical survey that shows since 1972 Japan has exported more technology under new contracts in the manufacturing sector than it has imported.

In the past, Japan concentrated on investing human resources in applied science and production technology rather than in basic research. Business leaders contend that this cannot continue and the private sector should invest the large expenditures required for research and development. Contrary to the popular image in which the Japanese government is pictured as dominating technology, 70 percent of actual research and development (R&D) expenditures come from industry. In the United States, by comparison, the government funds about 50 percent of all research and development, and if defense-related research is excluded, 35 percent.

The Japanese government's role in technology is to help build a consensus on the direction of technology. The Ministry of International Trade and Industry and the Science and Technology Agency have recently begun to develop projects in future sciences. Some industry leaders are pressing for a coordinated effort in which the government would concentrate on long-term strategy, the academic community would run the research and industry would pay for the costs.

At a 1980 seminar of the Japan Federation of Economic Organizations (Keidanren), the president of Hitachi Ltd. pointed out that "the private sector shoulders 70 percent of R&D expenditures, employs 60 percent of the researchers, and carries out 50 percent of all applied research and 80 percent of all development research."[8] He also emphasized the importance of a solid education in science and technology to encourage creativity and observed that innovative scientific education from a young age is vital.

Even though there has been strong criticism both in Japan and abroad about the monolithic nature of the education system, the government's efforts to provide diversified types of education are slowly beginning to have effects. A new national university was founded in 1973 which abolished the faculty system and divided the students into six blocs with interdisciplinary courses. In 1976, two national engineering colleges for graduates of vocational high schools were established. The Ministry of Education since 1972 has been re-shaping college requirements to allow more choice in course work requirements and majors.

According to Nobel Prize winner Kenichi Fukui of Kyoto University,[9] the engineering department in the Japanese university system has always dominated other science disciplines and has particularly emphasized specialization in mechanical, electrical and structural engineering. There have been very few theoretical courses; instead there has been more integration of basic and applied research. His view is that with more integration of the disciplines and a blurring of the boundaries of physics, chemistry and biology, for example, an education in basic research is vital. Business leaders also agree that Japan needs to invest more in basic research. The Keidanren symposium mentioned above surveyed 200 leaders in manufacturing whose priorities for basic research lie in the following areas: nuclear energy, aerospace, life sciences, marine sciences, information and software.

The business community has always been active in educational policy.[10] Its criticism of the postwar school system centered on the rigidities which prevented students from pursuing a more flexible curriculum. A 1972 report urged moving toward fields useful in a more information-oriented society. Earlier in 1960, industry's concern over the shortage of college graduates in science and technology persuaded the government to increase the quota for college students in this field. Industry is well represented in the Education Ministry's advisory council which determines the nation's educational guidelines. Even though the private sector rarely exercises direct influence, and does not usually hold Cabinet or other political posts, it has close contact with the Liberal Democratic Party's education committee members and the Ministry of Education.

Strains in the educational system derive from the continued confrontation between the political/business establishment and Nikkyoso, the powerful teachers' union. Nikkyoso and its parent organization, the government employees' union Sohyo, which is affiliated with the Japan Socialist Party, is wary of any attempts to restore traditional prewar values and subject the nation, as they see it, to a new conservatism. They have opposed the proposal to diversify elementary and high schools by type, arguing that it will create class distinctions.

Conclusion

The Japanese school system is not without problems. Competition in the college examination system produces great stress, imposes a serious financial burden and promotes a rigid career development ladder. Even though almost all junior high school students enter senior high schools, the number of drop-outs has been increasing because of academic problems. The quality of the teachers is often questioned, and parents are increasingly frustrated by what they see as shortcomings in the system. The affluent society has produced children who do not have the same view of life as their parents. Educational experts voice concern that while compulsory education has been achieved, academic ability has been declining.

On the other hand, there are signs that a considerable number of students are benefiting from their education. So far, there has not been any serious opposition to the emphasis on mathematics and sciences, and Japan's postwar achievements in education certainly seem to lay the foundation for a strong, technologically oriented population in the future.

Footnotes

(All materials are in Japanese unless otherwise indicated.)

[1]Ministry of Education, White Paper on Education (Waga Kuni no Kyoiku Suijun), 1980.

[2]Ministry of Education, Education Expenses Disbursed by Parents (Fukei ga Shishutsu Shita Kyoikuhi), 1980.

[3]White Paper, Table 1.

[4]Ibid., and Ministry of Education, Guidelines on Senior High School Curriculum (Koto Gakko Gakushu Shido Yoryo), August 1978.

[5]White Paper.

[6]Mary Jean Bowman, Educational Choice and Labor Markets in Japan, (The University of Chicago Press, 1981) (in English).

[7]"Recruitment in the 1980s" (Gendai Shushoku Mondai Kenkyu-kai), Chuo Koron Business Management Quarterly, Summer 1980.

[8]Keidanren (Japan Federation of Economic Organizations), Technological Progress (Waga Kuni no Gijutsu Kaihatsu o Kangaeru), March 1980.

[9]Kenichi Fukui, "On Receiving the Nobel Prize," Chuo Koron, April 1982.

[10]Yung H. Park, "Big Business and Education Policy in Japan," Asian Survey, March 1982 (in English).

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Table 1: Education Expenditures in Japan

(in millions of yen)

Year	GNP	Education Expenditures	Percent of GNP	Public School Expenditures	Percent of Education Expenditures	Private School Expenditures	Total Government Expenditures	Percent of Public School Expenditures to Total Government Expenditures
1950	¥ 33,515	¥ 1,739	5.1%	¥ 1,598	91.9%	¥ 141	¥ 9,146	17.5%
1955	72,985	4,373	6.0	3,720	85.1	653	17,242	21.6
1960	132,691	7,522	5.7	6,125	81.4	1,397	29,096	21.1
1965	162,328	17,882	6.8	13,850	77.5	4,032	62,359	22.2
1970	606,325	35,470	5.8	28,844	81.3	6,627	141,698	20.4
1975	1,240,386	96,114	7.7	81,189	84.5	14,924	363,972	22.3
1976	1,376,498	107,911	7.8	90,416	83.8	17,494	417,721	21.6
1977	1,522,872	123,000	8.1	102,906	83.7	20,094	491,488	20.9
1978	1,659,961	139,167	8.4	117,811	84.5	21,356	567,704	20.7

Source: Ministry of Education, White Paper on Education, 1980.

Table 2: Percentage Distribution in Major Fields of Study

Undergraduate Programs

Year	Humanities	Social Science	Science	Engineering	Agriculture	Physical Education	Education	Others
1960	12.9%	42.9%	2.7%	15.4%	4.7%	5.9%	10.5%	5.0%
1965	12.7	43.1	3.0	19.5	4.1	5.1	7.8	4.7
1970	12.7	41.8	3.1	21.1	3.7	4.9	6.9	5.8
1975	13.1	41.7	3.0	20.2	3.6	5.6	7.2	5.6
1980	13.8	40.5	3.1	19.4	3.4	6.4	7.9	5.5

Master's Programs

1960	34.6%	28.5%	11.9%	14.7%	4.5%	1.7%	*	4.1%
1965	18.5	20.0	13.1	33.7	6.1	3.1		5.5
1970	18.6	16.6	10.8	37.0	7.4	3.3		6.3
1975	17.8	13.7	9.6	40.3	8.0	3.0		7.6
1980	15.3	11.3	10.5	41.5	7.1	4.2		10.1

Doctoral Degree Programs

Year	Humanities	Social Science	Science	Engineering	Agriculture	Medicine	Education	Others
1960	13.7%	12.0%	12.1%	5.3%	4.6%	46.4%	*	5.9%
1965	11.0	9.3	10.7	11.0	3.6	47.9		6.5
1970	14.2	13.0	17.1	17.8	6.3	22.1		9.5
1975	16.5	14.7	15.8	16.9	6.8	18.4		10.9
1980	15.7	13.3	14.2	12.9	6.0	26.1		11.8

*Included in Humanities
Source: Ministry of Education, White Paper on Education, 1980.